

## THE ROUTINE EXAMINATION IN A GENERAL HOSPITAL FOR DIPHTHERIA CARRIERS AND A NOTE ON THE SCHICK REACTION.\*

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Modern medicine has made no advance more important than that concerning the prevention of disease. The eradication of yellow fever in Havana is a brilliant example of the potency of prophylaxis. Vaccination, the study of water supplies and sewage disposal, and other hygienic measures have had a marked effect in reducing the morbidity of typhoid fever. The dissemination of certain infections, of known and unknown etiology, is brought about in many instances by the harboring in the tissues of the recovered individual or of the healthy "contact" the infectious agents. Notable among these diseases are typhoid fever, epidemic meningitis, diphtheria and probably pneumonia and poliomyelitis. Today, the subject of "carriers" commands our attention and the laboratory must be prepared to examine excreta for the presence of typhoid bacilli and nasal and throat secretions for meningococci and diphtheria bacilli.

A summary of statistics shows that about one per cent. of healthy throats yield diphtheria bacilli on culture. According to Jordan one to two per cent. of all persons give positive cultures, but of these about 17 per cent. only are virulent strains. Park and Beebe found that about 2.5 per cent. of individuals, not having been in contact with infection, showed bacilli. European and American statistics on the presence of Hofmann's bacillus in the upper respiratory tract show wide latitude. In New York City, Park noted that one per cent. of nasal and throat secretions showed this organism, while Jordan found 16 to 22 per cent. In England, Graham-Smith found 20 per cent. among poor adults and 9 per cent. among the well-to-do. With examinations on series of 200 or more "non-contact" adults, positive findings vary from 0 to 97 per cent.—the highest in Europe.

An important aid in the study of diphtheria is the Schick<sup>1</sup> immunity test, which consists of the intradermic injection of a freshly standardized diphtheria toxin so diluted with normal saline that 0.1 or 0.2 c.c. contains 1/50 MLD for a 250-gram guinea pig. With less than 1/30 of a unit of diphtheria antitoxin in the patient's blood serum per c.c., a positive reaction ensues, which consists within twenty-four hours of the development of an hyperemic areola measuring 5 to 25 m.m. in diameter and more or less induration. The maximum intensity is usually reached at about forty-eight hours and thereafter for a week there is a progressive decline of color to a brown with which there is more or less desquamation. A pseudoreaction (probably protein hypersusceptibility) is one in which hyperemia and induration develop more quickly and have almost disappeared at the end of forty-eight hours. There is less pigmentation and desquamation is ab-

sent. A negative reaction implies immunity to diphtheria. It is necessary that the toxin be intradermically administered, preferably on the flexor surface either of the upper- or fore-arm with a sharp, fine needle.

Park, Zingher and Serota<sup>2</sup> have reported on the examination of 700 children in the Willard Parker Hospital, New York City, and noted that the period of greatest susceptibility to infection is between the ages of two and four years, that the children of the same family give usually a similar reaction, etc. After a very complete description of the technic, etc., they conclude that "(1) The Schick reaction served as a reliable and convenient index of the susceptibility or non-susceptibility of individuals to diphtheria. (2) It served also as an accurate clinical test to determine the efficiency of active immunization with mixtures of diphtheria toxin and antitoxin. (3) It has helped us in the diagnosis of clinically doubtful nasal diphtheria . . . . (4) It has added further experimental proof to the clinical experience that very toxic cases of diphtheria require the early intravenous administration of large doses of antitoxin . . ." Bundesen<sup>3</sup> has reported on 800 Schick tests and notes the similarity of statistics given by Schick, Park and himself relative to diphtheria hypersusceptibility, as elicited by the reaction, and the reported cases of the disease in infancy and childhood. Among his concluding statements he notes that the test permits of a great reduction in antitoxin bills and that the possibility of anaphylactic shock is greatly minimized by its use. Graef and Ginsberg<sup>4</sup> have reported on the reaction which was carried out during a diphtheria epidemic among nurses. Moody<sup>5</sup> found in the study of 316 children prophylactically injected with 1000 units of antitoxin that immunity is effective for a period of less than four weeks in over one-half of the total. Kolmer and Moshage,<sup>6</sup> Weaver and Maher,<sup>7</sup> and Moody and Woodruff<sup>8</sup> have also reported on the Schick reaction.

**PERSONAL OBSERVATIONS.** During the past several weeks there have been an abnormal number of diphtheria cases in San Francisco and vicinity. An examination of the throats of the patients (adults), internes, nurses, orderlies and porters in the Southern Pacific Hospital was made to determine the percentage of "carriers" in a general hospital, their infectiousness, etc. The period of study extended over 41 days. A swab was made in each case from the naso-pharynx; a Löffler tube was inoculated and two smears made. All tubes were incubated for about sixteen hours and smears were stained by the Löffler method. Two hundred throats were examined and none showed diphtheria bacilli. Twelve of 171 persons (7 per cent.) gave a history of diphtheria. The remainder (29), foreigners, could not interpret questions satisfactorily relative to their history. None gave a history of recent exposure to diphtherial infection. Twenty-seven, or 13.5 per cent., of the cases showed Hofmann's bacilli. Nine cases showed fusiform bacilli and one, spirilla, and two cases showed both. One showed a yeast.

The Schick test was carried out on 44 adults. The toxin was obtained through the courtesy of the

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Cutter Laboratory, Berkeley, and was diluted freshly for use so that 0.1 c.c. represented the standard quantity. The flexor surface of the upper-arm appeared preferable to the fore-arm for intradermic administration. A 1 c.c. elongated Burroughs-Wellcome syringe with No. 1 gauge needle was used. Thirteen, or 29.5 per cent., reacted positively. The most severe reactions were elicited in three individuals who gave a history of having had diphtheria. Two pseudoreactions were noted in the same group. One case of diphtheria was present in the hospital and received 15,000 anti-toxin units. On the ninth day the first of three consecutively negative throat swabs was obtained.

**CONCLUSIONS.** Throat examinations of 200 adults in a general hospital showed no "diphtheria bacilli carriers." Of these 7 per cent. gave a history of having had diphtheria but in no instance was it a recent infection. Hofmann's bacilli were found in 13.5 per cent. of the total cases. About 30 per cent. (44 cases) were Schick positive and the strongest reactions were noted in three individuals who had had diphtheria. Those who have reported on the Schick reaction uniformly attest to its value.

#### References.

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## BANTI'S DISEASE.

By HENRY H. LISSNER, M.D., Los Angeles.

Mr. P. L. Age 25 years. Occupation, salesman. Married. One child.

**Family history:** Father died suddenly by accident. One brother and one sister died in infancy, the cause is unknown to patient. No tuberculosis in family.

**Personal history:** Had malaria seventeen years ago in New York. Measles when a child. No history of typhoid fever, rheumatism or pneumonia. At the age of twelve years he was taken to a physician who informed his mother that his spleen was enlarged.

**Present history:** Began about three months ago with itching of the skin. He then noticed that he was getting yellow; this condition would clear at times, and then again, would become more intense. No chills, fever or pain in the region of the liver or gall-bladder at the time of the onset of the jaundice; neither was there any nausea or vomiting, or stomach pain present. Bowels were always regular, two or three movements daily, sometimes quite pasty and soft, but other times formed stools with a tendency to normal color. He had pain twice in right iliac region just below McBurney's point, which always came on following exertion as walking or climbing. This pain lasted about ten minutes and was relieved by his assuming a recumbent position. About eleven days ago he noticed that he was beginning to swell particularly high up in the abdomen; no pain accompanied the swelling, just an uncomfortable feeling. This swelling has gradually increased up to two days ago, when he thinks it came to a stand-still. He belches some at present. His appetite is good. No shortness of breath, except on exertion. No palpitation. He has a cough at present, but previous to this illness he never had a cough. He raises some white, glary mucus. He has no hemoptysis. No night sweats. Nocturnal urination once or twice, but this was always his habit. Skin itches constantly, but worse at night. His habits are good. Sleep is O. K. He is of the opinion that he has lost about twelve pounds in the last twelve weeks.

**Examination:** Eyes, reaction to light and accommodation normal. Sclera is jaundiced, as is also the skin. Nothing abnormal found in the neck; no glands or pulsations. Throat is normal in appearance; tonsils not enlarged. Lungs; impaired resonance over right apex but no change in breath sounds. No retraction of apices. Excursion of diaphragm on both sides normal. Heart; left border apparently at left nipple line, right border at right sternal margin. Accentuated aortic second. No audible murmurs. There was no marked precordial impulse. Liver; upper border of liver dullness in fifth interspace in the nipple line. Not able to palpate or percuss the lower border of liver dullness, because of extreme distention of the abdomen. No tenderness of liver. Spleen: Upper border of dullness in the left anterior axillary line in the sixth interspace. The lower border runs into abdominal dullness due to the fluid; palpating for the spleen elicits tenderness in this area. Abdomen is distended, the fullness being most marked below the xiphoid where prominence is decided. There is dullness in the flanks which is replaced by tympany upon change of position. No points of tenderness in the abdomen, except in the splenic region. No edema of feet. Pulse rate 60. Respiration 18. Temperature 97°.

On January 15th three pints of green fluid were obtained from the abdomen by the trochar; following this, the liver could be palpated; the edge was smooth, not tender, about one inch below the costal margin. The spleen is palpable with a large, smooth definitely rounded border extending forward from the costal arch on the left side to

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